Can small group education and peer review improve care for patients with asthma/chronic obstructive pulmonary disease?

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Abstract

***Objective*—To study the effectiveness of an intensive small group education and peer review programme aimed at implementing national guidelines on asthma/chronic obstructive pulmonary disease (COPD) on care provision by general practitioners (GPs) and on patient outcomes.**

***Design*—A randomised experimental study with pre-measurement and post-measurement (after one year) in an experimental group and a control group in Dutch general practice.**

***Subjects and intervention*—Two groups of GPs were formed and randomised. The education and peer review group (17 GPs with 210 patients) had an intervention consisting of an interactive group education and peer review programme (four sessions each lasting two hours). The control group consisted of 17 GPs with 223 patients (no intervention).**

***Main outcome measures*—Knowledge, skills, opinion about asthma and COPD care, presence of equipment in practice; actual performance about peakflow measurement, non-pharmacological and pharmacological treatment; asthma symptoms (Dutch Medical Research Council), smoking habits, exacerbation ratio, and disease specific quality of life (QOL-RIQ). Data were collected by a written questionnaire for GPs, by self recording of consultations by GPs, and by a written self administered questionnaire for adult patients with asthma/COPD.**

***Results*—Data from 34 GP questionnaires, 433 patient questionnaires, and recordings from 934 consultations/visits and 350 repeat prescriptions were available. Compared with the control group there were only significant changes for self estimated skills (+16%, 95% confidence interval 4% to 26%) and presence of peakflow meters in practice (+18%, $p<0.05$). No significant changes were found for provided care and patient outcomes compared with the control group. In the subgroup of more severe patients, the group of older patients, and in the group of patients not using anti-inflammatory medication at baseline, no significant changes compared with the control group were seen in patient outcomes.**

***Conclusion*—Except for two aspects, intensive small group education and peer review in asthma and COPD care do not seem to be effective in changing relevant aspects of the provided care by GPs in accordance with guidelines, nor in changing patients' health status.**

(*Quality in Health Care* 1999;**8**:92–98)

Keywords: patient outcomes; peer review; asthma; chronic obstructive pulmonary disease; randomised

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Accepted 29 March 1999

In the past few decades scientific research has resulted in many new views on diagnosing and treating asthma and chronic obstructive pulmonary disease (COPD) in general practice. For use in actual practice these views have been translated into guidelines and consensus reports. These summarise the best evidence available and contain recommendations on management of these conditions to reduce variation in performance, to tackle underdiagnosis, and to stimulate adequate treatment.[1–3] Focus is on earlier detection, systematic assessment of lung function through peakflow, prescription of anti-inflammatory medication, and a regular follow up. National guidelines for general practice on asthma/COPD management in adult patients were developed in the Netherlands in line with these ideas on good clinical practice.[4 5] The question is how to implement such guidelines and make them work in practice; this will largely depend on the strategies used to disseminate and implement them. Various systematic literature reviews on effective strategies for implementation of guidelines have been published.[6–10] The main conclusion is that the evidence for many strategies is lacking or confusing, and that a combination of interventions will be most successful in changing performance in practice.[11]

A rigorous analysis of the literature by Grimshaw led to the conclusion that guidelines are most effectively introduced among the target group through interactive methods, involving the care providers actively.[6 7] This links up with the experience in many European countries that small group education and peer review is an effective method for changing general practitioner (GP) performance.[12 13] Good scientific evidence for such a method is, however, largely lacking. Furthermore, little information exists on the effects on patients, which is true for most strategies for changing clinical practice. The review by Grimshaw showed that the effects on patient outcomes were assessed in only 20% of the included studies.[6 7] A controlled study was set up therefore to evaluate the effects of a specially developed small group education and peer review

In Dutch general practice and in the national guidelines for GPs on asthma/COPD, no clear distinction was made between asthma and COPD until recently. This is based on the, in the Netherlands broadly accepted, "Dutch hypothesis" which presumes a common aetiological factor in both diseases.[14] Furthermore, it was not routine activity in general practice to determine lung function. Subsequently, no clear distinction could be made in this study between asthma and COPD. However, since no differences in effects in this study were observed between younger and older patients, a difference in outcome between asthma and COPD seems less probable.

Box 1 Dutch guidelines

programme on the implementation of the national guidelines for general practice. The effects on knowledge, skills, and opinions of GPs, on the care provided as well as on patients symptoms, exacerbations, and quality of life were studied.

Methods

DESIGN AND SUBJECTS

An experimental study with pre-measurement and post-measurement after one year was set up; the experimental group participated in an intensive interactive group education and peer review programme and the control group received no intervention. GPs (n=52) in the south eastern region of the Netherlands were contacted for participation through their local groups. A balanced distribution in degree of urbanisation and type of practice was aimed at. A total of 34 GPs decided to take part. The 18 non-participating GPs differed significantly in their type of practice (85% single handed *v* 44% of the participating GPs; p=0.008 χ^2). Two groups of GPs were formed, equal for type of practice (single handed or not), membership of the Dutch College of General Practitioners, and perceived skills in lung function measurement and inhalation instruction. GPs in the same local group were preferably allocated to the same education group. These groups were allocated at random to the experimental and control modality of the study. GPs were asked to select all known patients with asthma/COPD in their practice. To reduce underselection this was done in the same way for both groups, with the aid of the researcher through pharmacy lists of all prescribed asthma medication in the previous year. To select patients with asthma/COPD to whom the guidelines would be applicable and who could be expected to have regular contact with the general practice for their asthma or COPD, only those patients were included who had actual complaints or medication use. This was done by using patient questionnaire data. Included were patients aged ⩾25 years, currently using medication for respiratory complaints or having one of the following symptoms: chronic coughing or expectoration of phlegm; at least one period (minimum three weeks) of coughing or expectoration of phlegm in the past three years; asthma or complaints of breathlessness during the past year; or asthma attack(s) during the past year. Patients treated by pulmonary physicians or patients with serious comorbidity were excluded.

- General: aims of the national guidelines; decline of lung function as a risk factor
- Diagnosis: underdiagnosis of asthma/COPD; discrepancy between complaints and lung function; peakflow and lung function measurement
- Treatment: smoking cessation; indication and use of inhaled medication (bronchodilators, steroids); influenza vaccination
- Follow up: frequency; contents
- Treatment of exacerbations: prescription of antibiotics and short courses of oral steroids
- Patient education: house dust mite eradication and use of written patient information

Box 2 Topics of intensive small group education and peer review programme

INTERVENTION

An intensive, interactive group education and peer review programme, aimed at introducing the national guidelines and containing a combination of specific strategies, was developed and applied. The intervention focused on gaps in adherence to the guidelines, identified in findings of the baseline measurement (box 2). Four sessions lasting two hours each were organised; various strategies for implementing the guidelines were used: lectures, role playing, skills training, peer review of performance, group consensus discussions, and problem solving of hypothetical situations involving patients. The group education and review was done in two small groups (with nine and eight GPs, respectively) and was supervised by an experienced GP. In addition, one educational session was organised for practice assistants from the participating practices, focusing on knowledge of asthma/COPD, peakflow measurement, and inhalation instructions.

INSTRUMENTS AND VARIABLES

The effect variables were divided into *structure*, *process*, and *outcome* variables (table 1).

Structure

Structural aspects were measured by a written questionnaire completed by the GPs[15]: knowledge of management of asthma exacerbations and acute severe dyspnoea (10 questions from an existing questionnaire for GPs in vocational training; score "correct minus wrong") and of inhalation treatment (eight questions, same questionnaire); opinions of GPs on key recommendations from the national guidelines (nine questions (dis)agree); and five questions on the self estimated ability to measure lung function and inhalation instruction (good, a bit, hardly/not). Finally, there were eight questions (present/not present) on presence of peakflow meters for providing home use to patients (two

Table 1 Indicators of "quality of asthma care" divided into structure, process, and outcome of care, used as main outcome measures

Structure	*Process*	*Outcome*
Knowledge	Actual performance according to guidelines concerning:	Clinical:
Diagnosis and treatment of acute severe asthma and exacerbations	Lung function measurement	Symptoms (severity, exacerbations)
Inhalation technique	Advice on smoking cessation, influenza vaccination, and house dust mite eradication	Smoking habit
Skills in:	Prescription of anti-inflammatory medication	Functional status:
Lung function measurement	Prescription of inhaled medication only	Disease specific quality of life
Inhalation instruction	Treatment of exacerbations	
Opinion on key features of the guidelines	Patient education	
Equipment for:		
Lung function measurement		
Patient education		
Treatment of acute severe dyspnoea		

questions), on education and inhalation instruction materials (two questions), and on equipment for treatment of acute severe dyspnoea (four questions). All items were directly derived form the national guidelines and selected after discussion with co-authors of the national guidelines and experienced GPs.

Process

Process of care was measured through self recording by the GPs of their performance in contacts with patients with asthma/COPD during a period of three months (at least 15 successive contacts were asked for) and through recording of repeat prescriptions for patients with these conditions. Structured self recording sheets were developed for this purpose, containing key elements of the national guidelines. Data were collected on measuring lung function, prescription of inhaled medication, and anti-inflammatory medication; and on the management of exacerbations. Research has shown that this assessment of own performance is a reliable instrument for recording GPs' treatment; the agreement similarity with observations by non-participating GPs yielded an average κ of 0.76.[16 17] Additional data on the process of care, concerning the advice given on smoking cessation, influenza vaccination, and house dust mite eradication and on patient education provided were collected through written questionnaires completed by the participating patients.

Outcomes

Outcomes of care were measured using data from patient questionnaires. The indicators were derived from the goals of treatment as are formulated in the national guidelines.

- Asthma/COPD symptoms were assessed using the questionnaire of the Dutch Medical Research Council (MRC)[18]: the presence of chronic cough and chronic phlegm (yes/no); and the degree of dyspnoea (three point scale: no dyspnoea=0; dyspnoea when in a hurry=1; when walking with others on flat ground=2; having to stop for breath or worse=3).
- The number of exacerbations was assessed by asking the patient about (duration of) complaints or (changes in) phlegm, cough, dyspnoea, wheezing, and use of bronchodilators during the previous three months. An exacerbation was defined as an episode of more than three days with more than three out of the five complaints mentioned.[19]
- Smoking habits were assessed by asking for actual smoking behaviour (yes/no).
- Quality of life was measured by the respiratory illness questionnaire (QOL-RIQ), a self-administered questionnaire which has been especially developed for use in primary care and validated for patients with asthma, COPD, and emphysema.[20] The instrument contains 56 items divided over seven subscales on breathing problems (11 items), physical problems (9 items), emotions (9 items), situations triggering/enhancing breathing problems (7 items), daily/domestic activities (10 items), social activities/relationships and sexuality (6 items), and general activities (4 items). A seven point Likert scale is used. Content validity, construct validity, and internal consistency have been shown to be acceptable in the Dutch population. According to our guidelines, an individual dummy score was introduced in case of missing data (that is, 50% missing allowed per subscale, one subscale on the whole list).

STATISTICAL ANALYSIS

For the structure and process of care, statistical testing was done for all changes in effect variables between groups as well as for those within groups. Data from the GP questionnaire (binominal paired data) were tested by McNemar and χ^2 with continuity correction given the low numbers for each cell. In case of normal

Table 2 Characteristics of patients in the education and peer review group and the control group on entry study

	Education and peer review group; n=210 (%)	*Control group; n=223 (%)*
Mean age (years)	52	49
Sex (% men)	38	41
Current smoking	32	31
Current medication use	91	89
Use of inhalation medication	82	83
Use of preventive medication	32	31
Continuous daily use of >2 bronchodilators	19	17
Mean duration asthma/COPD complaints (yrs)	17	14*

*Difference significant p<.05 (ANOVA).

Table 3 Change in knowledge, skills, and opinion in accordance with the national guidelines. Values represent baseline score and change (Δ) (95% CI)

	Education and peer review group (n=17)			*Control group (n=17)*				
Structure of care	*Baseline (95% CI)*	*Δ (95% CI)*	*p Value*	*Baseline (95% CI)*	*Δ (95% CI)*	*p Value*	*Difference in mean change (95% CI)**	*p Value**
Knowledge score on:								
Diagnosis and treatment of exacerbations (0–10)	3.6 (2.4 to 4.8)	+1.2 (0.0 to 2.4)	0.06	4.6 (3.3 to 5.7)	−0.2 (−1.5 to 1.1)	0.4	+0.9 (−0.6 to 2.4)	0.25
Inhalation treatment (0–8)	3.7 (2.4 to 5.0)	+1.3 (0.2 to 2.4)	0.03	4.6 (4.0 to 5.3)	−0.5 (−1.3 to 0.3)	0.5	+1.1 (−0.4 to 2.6)	0.15
Skills performance score (0–5)†	2.85 (2.3 to 3.5)	+1.2 (0.5 to 1.9)	0.002	2.7 (1.9 to 3.6)	+0.5 (−0.2 to 1.2)	0.13	+0.8 (0.2 to 1.3)	0.006
Opinion score on main topics from guidelines (0–9)	6.5 (5.5 to 7.5)	+1.2 (0.7 to 1.7)	0.02	6.4 (5.5 to 7.2)	+0.6 (−0.2 to 1.0)	0.2	+0.6 (−0.3 to 1.5)	0.3

*After correction for baseline value (ANCOVA). †Five items; 0 = if for no items skill is "good"; 5 = if for all items skill is "good".

distribution, differences in the composite scores, such as "knowledge", "skills", and "opinion", were tested by means of analysis of covariance (ANCOVA). In these analyses corrections for baseline values were calculated by introducing the baseline value as covariate. Data on self recorded performance in consultations (unpaired data) and the patient questionnaire data (paired data) were analysed at GP level. Given the different number of consultations/patients for each GP a score for each GP was calculated from the number of consultations or patients in which the care was provided in accordance with the national guidelines, divided by the total number of consultations or patients of that GP. This was done both at pre-measurement and post-measurement. ANCOVA was calculated and each time the baseline value was corrected for by introducing the baseline value as covariate.

For patient outcomes it was first investigated whether the patient could be used as the unit of analysis because a nested design was used in which the GPs and not the patients were randomised.[21 22] This randomisation was done at GP level because the intervention was aimed at the GP. Furthermore, it is not possible to randomise patients within one practice because of expected contamination. Analyses taking account of the intraclass correlation (HLM) produced virtually identical results to analyses that ignored it, thus for simplicity only results based on patient analyses are presented here. Differences between baseline values using χ^2 and analysis of variance were tested for. Differences between pre-measurement and post-measurement were tested for normal distribution. Changes in asthma symptoms and smoking habits were tested for within group and between group differences by means of the McNemar and the χ^2 test; changes in the number of exacerbations between groups were tested by the distribution free Kruskal-Wallis test for ordinal data, and were tested for within groups with the McNemar test. The differences in the quality of life scores were analysed by ANCOVA, correcting for baseline value by introducing baseline value as covariate. Subgroup analyses were calculated for three groups of patients: patients with complaints not using preventive medication at baseline; more severe patients (patients having at least grade 3 dyspnoea and/or chronic cough and/or chronic phlegm at baseline); and younger versus older patients (<55 years *v* ⩾55 years).

For the level of significance p<0.05 was chosen.[23]

Results

SUBJECTS AND DATA

All 34 GPs completed the written questionnaires before and after measurement. No differences were observed between the two groups for characteristics of GPs, such as age, sex, practice form (single handed versus not single handed), membership of the Dutch College, self estimated skills, and mean number of participating patients for each GP in the study. The make up of the participating GPs did not differ significantly from the national for type of practice (44% single handed *v* 54% national), membership of the Dutch College (68% member *v* 63% national), and age distribution.

Two GPs from the experimental group and two GPs from the control group did not record their performance in consultations before and after measurement due to illness (n=2) or lack of motivation (n=2). The remaining 30 GPs recorded 507 GP-patient contacts and 167 repeat prescriptions before measurement (average recording period 3.5 months) and 427 GP-patient contacts and 183 repeat prescriptions at post-measurement (average recording period 3.1 months).

No differences were observed in the number of recorded consultations between the two groups.

Table 4 Change in adherence to the guidelines for presence of equipment in practice. Values represent baseline score and mean change (Δ)

	Education and peer review group (n=17)		*Control group (n=17)*		
Structure of care	*Baseline*	*Δ*	*Baseline*	*Δ*	*p Value of between group change†*
Presence of equipment in practice for*					
Peakflow measurement	12	+5‡	9	+2	0.04
Patient education inhalation instruction materials	15	+2	11	+2	0.4
Treatment of acute severe dyspnoea	8	+4	9	+3	0.9

*Values represent change in number of GPs in which these topics were in accordance with the national guidelines.
†χ^2.
‡Within-group change p<.05 (McNemar).

Table 5 Change in adherence to the guidelines for non-pharmacological treatment. Values represent baseline score and mean change (Δ) (95% CI)

Process of care	Education and peer review group (n=16)			Control group (n=17)				
	Baseline (%)	Δ (95% CI)	p Value	Baseline (%)	Δ (95% CI)	p Value	Difference in mean change (95% CI)*	p Value*
Non-pharmacological general treatment:								
Advice on smoking cessation	63	+9% (0% to 19%)	0.07	59	+5% (−9% to 19%)	0.5	+5% (−9% to 20%)	0.5
Flu vaccination	39	−2% (−8% to 4%)	0.5	35	+3% (−4% to 10%)	0.4	−4% (−15% to 6%)	0.4
Advice on house dust mite eradication	17	−2% (−6% to 2%)	0.3	21	+4% (−2% to 10%)	0.2	−7% (−16% to 2%)	0.1
Written patient education	26	+3% (−7% to 13%)	0.6	21	+7% (−1% to 15%)	0.1	−1% (−13% to 11%)	0.8

*After correction for baseline value (ANCOVA).

A total of 891 patients were originally requested to participate by their GPs. After exclusion of those who did not meet the inclusion criteria, data from pre-measurement questionnaires were available for 544 patients. For each GP this was a mean number of 16 patients, which is approximately 50% of the expected number on the basis of epidemiological data.[24] The total dropout of patients during the study was 111 (20%): 46 (8%) had been consulting a pulmonary physician during the study year and the remainder (n=65, 12%) failed to respond. This resulted in 433 eligible patients whose data could be used in the analysis. Table 2 summarises characteristics of these patients. No significant differences existed between participants and dropouts for these characteristics, nor was there a significant difference between the groups with regard to the number of dropouts. The only significant difference between the groups was duration of the asthma/COPD complaints (14 *v* 17 years; p<0.05).

Participation in the meetings for the education and peer review group was as follows: seven out of 17 GPs were present at all four meetings, six GPs attended three meetings, and four GPs were at two or fewer meetings. Twelve out of 17 GP practice assistants from the experimental group attended the group education meeting offered.

Structure of care

Significant improvements were seen within the education and peer review group in knowledge on inhalation treatment (+16%; 95% CI 2% to 30%), self estimated skills (+24%; 95% CI 10% to 38%), opinion (+13%; 95% CI 9% to 19%), and the presence of peakflow meters in the practice (+29%; p<0.05) (tables 3 and 4). However, only for presence of peakflow meters and skills were the changes significant compared with the control group.

Process of care

The baseline data of the care in the education and peer review group did not show any difference with those in the control group. In both groups an improvement in provided care was seen; the improvement was most substantial in the education and peer review group. From the 12 selected effect measures in both groups, however, only one showed a significant change within the group (peakflow measurement in follow up of an exacerbation +26%; 95% CI 4% to 48%) (tables 5 and 6). This change was not significant (+30%; 95% CI −2% to 61%) compared with the control group.

Patient outcomes

No differences existed for the baseline level of patient outcomes in the two groups. No significant improvements were observed in the education and peer review group. In the control group, however, the disease specific quality of life improved on three out of seven subscales (tables 7 and 8). After correction for baseline value these improvements did not differ significantly between the two groups.

Subgroup analysis

Separate analyses were done excluding the GPs who were only present at two or fewer of the educational sessions. There were only slight differences for all outcome measures, which were only significant for the advice on smoking cessation (+13%, 95% CI 1% to 25%) and measurement of peakflow at follow up of an exacerbation (+33%, 95% CI 11% to 55%). However, neither were significant compared with the control group.

Table 6 Change in adherence to the guidelines for general pharmalogical treatment and management of exacerbations. Values represent baseline score and change (Δ) (95% CI)

Process of care	Education and peer review group (n=15)			Control group (n=15 GPs)				
	Baseline (%)	Δ (%) (95% CI)	p Value	Baseline (%)	Δ (%) (95% CI)	p Value	Difference in mean change (%) (95% CI)*	p Value*
General pharmacological treatment:								
Prescription of inhalation treatment only	98	+2 (−2% to 5%)	0.4	95	+4 (0% to 8%)	0.1	−1 (−3% to 1%)	0.3
No prescription of xanthines	94	+2 (−1% to 5%)	0.2	96	0 (−2% to 2%)	0.9	+0.1 (−.3% to 3%)	0.9
Anti-inflammatory medication in case of >2 td bronchodilators use	69	+11 (−5% to 27%)	0.2	65	+1 (−11% to 13%)	0.9	+13 (−2% to 27%)	0.09
Exacerbations; performance of peakflow measurement in:								
Diagnosis of an exacerbation	21	+16 (−2% to 34%)	0.09	20	+18 (9% to 27%)	0.02	−2 (−21% to 18%)	0.8
Follow up of exacerbation	37	+26 (4% to 48%)	0.03	47	−5 (−25% to 55%)	0.9	+30 (−2% to 61%)	0.2
Exacerbations; prescription of:								
Oral steroids	21	+13 (−6% to 32%)	0.2	29	+4 (−11% to 19%)	0.7	+5 (−19% to 28%)	0.7
Inhaled steroids	52	+13 (−1% to 27%)	0.08	51	−1 (−13% to 14%)	0.9	+14 (−4% to 32%)	0.1
Antibiotics (seldom indicated)	66	−17 (−1% to 34%)	0.07	64	−10 (−20% to 0%)	0.06	−5 (−22% to 13%)	0.6

*After corrections for baseline value (ANCOVA).

Table 7 Changes in number of people with grade 3 dyspnoea, chronic cough, chronic phlegm, current smoking, and exacerbations in the previous three months (ratio). Values represent baseline value (%) and change (Δ) per group

	Education and peer review group (n=210)		*Control group (n=223)*		
Outcome of care	*Baseline value (%)*	*Δ**	*Baseline value (%)*	*Δ**	*Between group change (p value)†*
Grade 3 dyspnoea	29 (14)	−1	21 (9)	+3	0.2
Chronic cough	68 (32)	−8	61 (27)	−12	0.3
Chronic phlegm	55 (26)	−7	51 (23)	−4	0.4
Current smokers	68 (32)	+2	69 (31)	+1	0.7
Exacerbation ratio (95% CI)	0.35 (0.24 to 0.46)	0 (−0.1 to 0.1)	0.44 (0.32 to 0.56)	−0.11 (−0.26 to 0.04)	0.1

*All within group changes not significant.
†χ^2/ Kruskal-Wallis.

Furthermore, subgroup analyses were calculated for those patients who might particularly benefit of improved care—that is, those who had complaints but did not use preventive medication at entry into the study and those with a more severe condition. No differences in the results were observed between the education and peer review group and the control group. Also, no differences in results were found in the subgroup analyses of different age groups (<55 years, ⩾55 years).

Discussion

The results showed that at the time of the study the care that GPs provided to patients with asthma/COPD was already in line with national guidelines for several essential aspects. However, there were also important deviations, for instance for the equipment, knowledge, and skills of GPs and the process of care. At patient level the most important problem seems to be the many patients who smoke.

Developments in the control group showed that without special measures only small changes in care provisions can be achieved. These small changes may have been caused by an "in care" effect or by a secular trend influenced by publication of the guideline. An intensive small group education and peer review programme, which combined various strategies, was proved to influence aspects of knowledge, skills, opinions, and the presence of equipment according to the guidelines, but had, except for one outcome measure, no significant influence on the provided care. Consequently, no changes were observed in the patients' health status and quality of life. The findings in the educational and peer review group support the idea that knowledge, skills, attitudes, and aspects of performance can be promoted to some extent through interactive and intensive small group education, but are not sufficient to be the only strategy used. The method used in this study, including a specially designed education package for implementing national guidelines and reviewing performance within small groups with a GP as tutor, corresponds with this model well. The results are also in line with previous publications. In a review of 99 trials on continuing medical education (CME) activities a positive change in at least one effect measure was found in about two thirds of the studies.[25] However, it was also concluded that formal CME conferences without enabling or practice reinforcing strategies had little impact. Thus, CME can be seen as a starting point for change but more activities are necessary to really implement changes. Also, as in our results, change in patient outcomes were seen less frequently. Apart from the small changes observed in the process of care and the relatively mild to moderate disease in these patients treated in general practice, as in our study, this infrequent change in outcomes may be caused by factors such as patients not accepting GP recommendations, the socioeconomic and educational status of the patients, and the limited effectiveness of the clinical interventions themselves.[26]

As previously mentioned, studies that evaluated the effects on patient outcomes of introducing a set of guidelines for asthma care in everyday general practice are scarce.[7] White, however, evaluated implementation of asthma guidelines on patient outcomes.[27] In a controlled trial (with about 400 patients) he investigated the effectiveness of group education (seven sessions) in groups of GPs during 22 years. Although there was a small (not significant) decline of reported complaints

Table 8 Changes in quality of life scores on QOL-RIQ. Values represent mean change (Δ) (95% CI) and baseline score

	*Education and peer review group (n=174)***		*Control group (n=203)**		
Outcome of care	*Baseline value*	*Δ (95% CI)*	*Baseline value*	*Δ (95% CI)*	*p Value of difference in mean change†*
Quality of life (total)‡	1.98	−0.01 (−0.09 to 0.07)	1.97	−0.09** (−0.16 to 0.02)	0.2
Respiratory complaints	2.51	−0.09 (−0.25 to 0.07)	2.58	−0.20*** (−0.32 to 0.08)	0.4
Triggering or enhancing situations	2.25	−0.08 (−0.18 to 0.02)	2.23	−0.05 (−0.17 to 0.07)	0.7
Physical complaints	1.93	+0.01 (−0.10 to 0.12)	1.96	−0.13*** (−0.21 to 0.04)	0.06
General activities	1.66	+0.04 (−0.9 to 0.17)	1.74	−0.15** (−0.27 to 0.03)	0.05
General daily activities	2.07	−0.04 (−0.14 to 0.06)	1.89	+0.02 (−0.07 to 0.11)	0.7
Social activities, sexuality, and relationships	1.77	−0.08 (−0.22 to 0.14)	1.77	−0.04 (−0.17 to 0.09)	0.2
Emotions	1.69	+0.01 (−0.12 to 0.10)	1.65	−0.10 (−0.20 to 0.0)	0.1

*Missing values total 56; within-group changes: **p<.05 ***p<.01 (ANOVA).
†After correction for baseline value (ANCOVA).
‡Scores from 1 (no impairment at all of quality of life) to 7 (very much impairment). A negative change indicates an improvement.

within the whole group of patients, no significant differences were seen compared with the control group. The conclusion was that participation in educational activities did not lead to a change in GP behaviour to such an extent that it would influence patient outcome. The results of our study confirm these findings about small group education, even though our programme contained a set of additional, possibly more effective, activities such as discussions, review of performance, and role play.

Some comments need to be made about the methodology. Because of the limited number of participating GPs in both groups, the results are prone to a type II error so that possibly a smaller improvement in GPs' performance would not reach significance. Presuming an equal importance of the selected effect measures, and excluding the two effect measures in which there is no room for improvement (baseline >95% in accordance with the guidelines), the average improvement in the provided care (10 effect measures) in the education and peer review group was 9%, and 5% in the control group. Possibly smaller improvements in GPs' performance could not reach significance. It is, however, questionable what the meaning of such a small improvement is in quality improvement. For patient outcomes, however, given the number of patients, the power of the study was sufficient to detect even small improvements as estimated relevant to patients.[28]

Furthermore, in interpreting the results we should consider the possibility of finding a positive result by pure chance given the many outcome measures and the study's p value of $p<0.05$. Also, randomisation was not done at patient level. Although there were no significant differences between patient characteristics and baseline outcome measures between the groups, confounding factors, potentially biasing the results, which had not been measured or were unknown cannot be excluded.

Although the power of intervention consisted of four sessions and was specially focused on the main problems in asthma and COPD care, not all GPs participated in all sessions and therefore some received only part of the information and stimuli. Nevertheless, this is reality in most GPs' further education. Because of the workload and the huge amount of important subjects and new guidelines, GPs can usually spend only limited time on each of the subjects. This did not bias the results, however, because a separate analysis without the non-participating GPs showed only a small difference in the results.

In conclusion, this study showed the strength, but mostly the limitations, of the model for small group education and peer review nowadays widely used in the Netherlands and other countries.[12] The model may be helpful in changing knowledge, skills, opinions, and some aspects of performance, but usually will not lead to a considerable change in GPs' performance or to the desired changes in patient outcomes. Additional activities and interventions will be needed to achieve optimal GP care for patients with asthma/COPD. In particular, interventions which focus more directly on specific activities in patient contacts, such as monitoring patients and providing patient specific feedback and reminders, may be effective at this level.[7 11] Further research exploring the value of innovative change strategies to fit this hypothesis is crucial.

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